DRIVING WHILE BLACK AND BROWN IN VERMONT: CAN RACE DATA ANALYSIS CONTRIBUTE TO REFORM?

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Abstract

Many states now require law enforcement to collect race data on traffic stops, but there has been little research on the use of that data to inform public policy or reform efforts at the agency level. This paper addresses that lacuna by presenting results from the first statewide analysis of Vermont traffic stop data. Racial threat theory, a subset of stratification theory, would predict that policing in a predominantly white state like Vermont would exhibit lower racial disparities than states with a more racially diverse population because the "threat" to white dominance is less. The results contradict that prediction. Vermont, despite its reputation as a liberal state, is not different from other states in exhibiting wide racial disparities in policing. And yet, analysis and dissemination of race data in policing, by providing an evidentiary basis for citizen claims of racial bias, contributed to action on the part of the state legislature and government to address racial discrimination not only in policing but also in the broader criminal justice system. We report on those reform efforts and on the actions taken by three reform-minded law enforcement agencies to reduce and eliminate unjustifiable racial disparities in policing.

DRIVING WHILE BLACK AND BROWN IN VERMONT: CAN RACE DATA ANALYSIS CONTRIBUTE TO REFORM?

I. Introduction

Vermont is perceived by many to be a political outlier in the United States. It was the first state to outlaw slavery in 1777. And in more recent history, Vermont was one of the first states to legalize civil unions, to push (unsuccessfully) for a single payer health care system, and to nominate a transgender gubernatorial candidate. Because of its progressive reputation, Vermont has also been perceived as a state with considerably less racial bias towards Blacks and Hispanics than is evident in other parts of the country. This assumption is challenged, however, by the first statewide analysis of traffic stop data that reveal notable Black-white and Hispanic-white disparities—larger than in a number of more racially heterogeneous states.

Because traffic policing is one of the most common circumstances under which members of the public interact with police officers, the data generated from stops yield a large database that can provide a window into racial disparities in the broader criminal justice system on which data may not exist or be harder to collect. Traffic data then can serve as a "canary in the coal mine," alerting agencies and the public to differential racial treatment in policing that spills over into other components of the criminal justice system.

In Vermont, data analysis has proven to be a fulcrum for reform, not only in policing but also in other domains of the criminal justice system. Although these efforts are in their early stages, they point to the efficacy of data collection and analysis for incentivizing reform efforts by providing evidence. This paper details the background leading to the statewide law requiring that all law enforcement agencies collect race data, the results of a statewide data analysis of traffic stops, and the subsequent reform efforts at the level of the legislature and government as well as

by law enforcement agencies themselves. We also reflect on the resistance of some law enforcement agencies and the problem of the lack of robust structures of accountability for law enforcement.

II. LITERATURE REVIEW

Police surveillance that targets people of color and in particular, African Americans, is not new. Racial profiling has been characterized as a form of social control used by law enforcement to maintain a racially hierarchical social order since the time of chattel slavery (Blumer 1958; Blalock 1968; Stucky 2011). With regard to traffic stops, as early as the 1930s, the NAACP began receiving complaints from Black drivers about distressing traffic stops for minor or false charges (Seo 2019). During the War on Drugs that began in the 1980s, traffic policing took on a new and important role in racializing policing. The "drug courier" profile, created by the Drug Enforcement Agency (DEA), outlined what were perceived to be common characteristics of drug carriers. This profile was used in highway traffic stops with a goal of interdicting drug trafficking along the I-95 corridor. Pretextual stops—stops based on minor violations of the letter of the law as a pretext for stopping a motorist an officer may want to investigate for other reasons—were legitimized in *Whren v. United States*. The DEA subsequently provided training to police officers in using pretextual stops in traffic policing (Hinton 2016). Claims of racial profiling led to lawsuits, however, causing a number of states to take action to address these inequities (Myers 2002).

North Carolina was one of the first states to mandate race data collection in traffic stops with a goal of robustly answering the question of whether drivers of color were treated differently than white drivers (Baumgartner *et al* 2018), and a number of other states followed suit. Extensive

data on race and traffic policing are now available at the state and local level.[1] In the first US study of its kind, Pierson *et al* (2020) undertook the task of analyzing multi-state data, based on 95 million traffic stops by 21 state patrol and 35 municipal agencies. The authors find that Black and Hispanic drivers are stopped and searched at higher rates than white drivers, a result that is consistent with that reported in public policy analyses and in numerous academic articles using city and state data.[2]

Agencies differ in racial disparities in policing, however, and a key question to be answered is what might cause variation in racial disparities. Close and Mason (2015), reporting on Florida State Highway Patrol data, find evidence that search rates are linked to the racial composition of law enforcement agencies. They found that troopers, regardless of race, engage in fewer vehicle searches when assigned to barracks with a larger share of Black and Hispanic troopers, and this contributes to more efficient searches (higher and more racially similar hit rates). Anwar and Fang's (2006) analysis of the same data set show that white troopers have higher Black-white and Hispanic-white search rate disparities than troopers of color. The racial composition of law enforcement agencies is thus a factor in influencing the culture and climate of agencies. In Vermont, where officers are primarily white, we might expect larger disparities.

Racial threat theory (or more generally, stratification theory) argues that policing acts as social control to maintain the disparate power and privileged position of the dominant racial group (in this case, people who identify as white). It is hypothesized that "threat" (and therefore policing disparities) will intensify, the larger the share of Blacks and Latinx relative to whites. This leads to the inference that the higher the share of Black and Latinx in the population, the wider the racial disparities in policing. Following the logic of racial threat theory, when people of color

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[1] Concerns about racial bias in traffic stops have failed to move the federal government to require traffic data collection, and as of this writing, there is no national or centralized data base.

[2] See the note to Figure 4 for examples of search disparity results from some of the studies conducted on traffic policing at the state or municipal level.

are a small minority of the population (such as in Vermont), the perception of threat is likely to be lower and thus we would expect to see fewer racial disparities in policing. This hypothesis had been difficult to test until now because so few of the predominantly white states in the US require the collection of traffic stop data.

The growing availability of traffic stop data around the country showing racial disparities has not been a panacea for policing reform. Several problems have plagued the usefulness of traffic stop data for reform efforts. One issue is that collecting data does not ensure that the data are analyzed in an unbiased manner. Another is that law enforcement agencies have challenged the validity of the data or have simply refused to acknowledge the findings. The most frequently criticized metric is racial stop rates, attributable to the benchmarking problem. Agencies often dispute the reliability of estimates of the driving population, for example, which are based on US Census estimates of racial shares of the population (Engel and Calnon 2004). Further, in response to racial differences in arrest and search rates, law enforcement typically argue that the data simply prove that Black and Latinx drivers exhibit a higher degree of criminality.

Local cultural and other contextual factors are also likely to determine the effectiveness of traffic stop data to stimulate reform. One element may be the power of communities of color to leverage change. In a North Carolina study, the authors developed a measure of Black political power to serve as a variable to explain racial differences in traffic stop outcomes (Baumgartner *et al* 2018). Using factor analysis on three variables—Black population share, Black share of voting population, and percentage of the local elected government that is Black—the authors construct a latent variable to measure Black political power in North Carolina's cities and towns. They find, as hypothesized, that higher levels of Black political power are associated with smaller racial disparities in the probability of a driver being searched. The inference is that higher levels of Black political power have a positive effect on law enforcement's willingness to institute effective

reforms that reduce racial disparities. These findings suggest that data on racial disparities in policing alone are not enough to instigate reforms. Further, one might conclude that reforms to address racial bias in policing are *less* likely to occur in states with small shares of Blacks and other groups of color in political representation. And yet, events since 2016 in Vermont, an overwhelmingly white state, have contradicted that prediction.

III. BACKGROUND

In 2007, a prominent African American resident of Vermont's largest and most diverse city, Burlington,[3] submitted an op-ed to a local newspaper, describing an incident of "driving while Black," arguing that racial profiling was an epidemic in Vermont (Colston 2007). Burlington's then police chief contacted the author of the op-ed, inviting him to meet to discuss the issue of racial profiling. Their meeting led to the formation of Uncommon Alliance, a group comprised of members of the community of color and area police chiefs. This grass roots organization served as a forum to bring local law enforcement officials and the community together in a collaborative effort to build public trust and police accountability through ongoing dialogue with a goal of addressing racial disparities in policing and the criminal justice system.

After months of meetings in which community members described their experiences of racial profiling, it became clear that anecdotes were not sufficient to convince law enforcement of their racially disparate treatment of people of color. As a result, although there was at that time no legal requirement for law enforcement agencies to collect race data in traffic stops, the five participating agencies agreed to do so voluntarily.[4] Analysis of data for 2009-10 identified notable

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[3] The white share of Burlington's population was 2017 was 84.9%, compared to 92.7% in 2007, with the share of the population that identified as Black or African American alone doubling during that time period (from 2.8% to 5.6%). At the state level, the share of people of color has also increased, rising from 3.9% to 6.0% in a decade, based on data from the American Community Survey.

[4] Burlington, South Burlington, Winooski, University of Vermont, and Vermont State Police participated in Uncommon Alliance meetings and voluntary race data collection in this early period.

racial disparities, results that were consistent with the concerns raised by the community of color (Seguino, Brooks, and Mitofsky 2012).

The Vermont legislature subsequently enacted 20 V.S.A. § 2366 in 2013, a bill requiring all law enforcement agencies to: 1) adopt a fair and impartial policing policy, and 2) collect race data on traffic stops beginning in September 2014 and to make those data publicly available. The authors conducted the first statewide analysis of racial disparities in traffic policing using that data, and results are discussed in detail in the next section.

III. STATEWIDE RACIAL DISPARITIES IN TRAFFIC POLICING

The dataset used to carry out the statewide traffic data analysis was compiled by the authors in response to data requests made to individual agencies. Not all agencies were compliant with the legislation. Nevertheless, by 2016, the largest agencies, covering roughly 78% of Vermont's population, reported their data.[5] Among the agencies that did report their data, some collected only a few of the required categories of data, and in cases where essential data were missing, results from these agencies could not be included.[6]

We examined outcomes for the entire state, using data for 2015, because that is the only year for which we have complete data from all 29 agencies that complied. In addition, we evaluated results for each agency separately using data for all years available, and these data span 2011 to 2016. The primary goal was to identify patterns in the data, based on an analysis of

[5] We were subsequently able to obtain data from the remaining agencies that had not submitted it as required by September 2016. The summary statistics shown in Tables 1 and 2 are very similar to those for the full sample. We report here the results of the partial sample rather than full sample, however, because it is those results that were made public and subsequently influenced public policy on policing.

[6] Missing data is a concern for several reasons. One important reason is it illustrates that some Vermont police departments believe they can ignore the law. Another concern is that police departments that do not provide all the required data may be trying to hide evidence of racial disparities. So, while we have a representative large sample of the total stops in Vermont in 2015, to the extent that missing data could cause a selection problem, our findings are likely to be biased toward zero. In other words, our findings are, if anything, more conservative than they would be if we had the complete data.

several indicators, for evidence of racial disparities that could be indicative of bias: 1) racial shares of stops compared to racial shares of the driving population; 2) racial differences in citations vs. warnings, 3) racial differences in arrest rates; 4) search rates by race; and 5) the percentage of searches that yield contraband. We report the results for all indicators,[7] but our main focus is on search rates by race as compared to the percentage of searches that result in contraband being found by race. This comparison offers a means to test for racial bias in policing (Persico and Todd 2008).

A. Racial Disparities in Stop Rates

The driver's race recorded in traffic stop incident reports is based on officer perception. In recording the perceived race of the driver, officers choose amongst the following categories: white, Black, Asian, Hispanic, and Native American.[8] To calculate racial disparities in stops, racial shares of traffic stops are computed and compared to the corresponding racial shares of the population. We use two sources of estimates of the racial shares of the driving population: 1) American Community Survey (ACS) population data from the U.S. Census Bureau, and 2) Vermont Department of Motor Vehicle (DMV) data on race of not-at-fault drivers from accident reports.[9] Each of these data sources has weaknesses and strengths. While the ACS population estimates are based on a sound sampling methodology, they do not capture the driving population. In contrast, the DMV data has the potential to provide a reasonable estimate of racial

[7] For the working paper with detailed data on a larger set of indicators by state, county, and municipality, see Seguino and Brooks (2017).

[8] The term "Hispanic" is used here to conform to the reporting categories officers choose from, rather than Latinx, the more widely used term today.

[9] For ACS data, at the agency and county level, we used the most recently available 3-year estimates (2011-13) of racial shares of the population as our comparison with racial shares of stops. We used the ACS 1-year estimate for 2015 as the estimate of the racial share of the state population. The number of whites is calculated as those that identify as "white alone" (from Table CO2003) in the ACS, while Blacks are those who identify as "Black alone" or in combination with one or more other races. The number of Asians is similarly estimated, and includes Hawaiians and Pacific Islanders. Estimates of the driving population based on DMV accident data are for 2011-16.

shares of the driving population, but a weakness is that race of not-at-fault drivers is missing in 37% of officers' accident reports from 2011-16.

Table 1 reports total stops where the officer recorded the driver's perceived race, racial shares of stops, and racial shares of the population and not-at-fault accidents in 2015 for all agencies combined. That table also reports statewide racial disparity indexes (the racial share of stops divided by the racial share of the driving population), calculated using both estimates of the driving population. A disparity index with a value of 1.0 indicates that a group is stopped at a rate that is equal to its share of the population—and thus indicates no disparity. An index that is less than 1.0 indicates a group is stopped at a rate that is lower than its share of the population, and conversely, an index greater than 1.0 indicates a group is stopped at a rate higher than expected, given its share of the population.

[Table 1 about here].

The data in Table 1 show that white and Asian shares of stopped are less than their estimated shares of the driving population. For example, white drivers comprise 94.4% of all stopped drivers, whereas the point estimate of their share of the driving population is 95.1% using the ACS and 95.4% using the DMV not-at-fault accident data. In contrast, Black and Hispanic drivers are over-stopped as compared to their share of the population, with disparity indices that range from 1.61 to 1.93.[10]

Figure 1 shows stop data by agency for Black and Asian drivers as compared to the county share of the population.[11] The bold horizontal line in the figure represents parity—that is, it indicates that the Black (Asian) share of stops is equal to the Black (Asian) share of the driving population. The agencies are ranked from highest disparity to lowest, left to right. We use county

[10] Drivers perceived to be Native American comprise a small share of all stops, and therefore due to data limitations, the focus in this study is on white, Black, Asian, and Hispanic drivers.

[11] Hispanics are omitted due to data limitations.

data as our measure of the driving population for several reasons. First, driving populations are more transient across city/town lines than county. Second, ACS sample sizes for some towns are too small for reliable population estimates.

Panel A provides data on the Black share of stopped drivers compared to the county driving population.[12] In all but a few towns, the Black share of stops exceeds the estimated Black share of the driving population. At the extreme is Vergennes, where Black drivers are stopped at a rate that is almost 3 times their estimated share of the county population. The data indicate that traffic police tend to treat Asian drivers more favorably than Black drivers (*Panel B,* Figure 1). The likelihood of Asian drivers being stopped is below their population share in all but a few agencies.

[Figure 1 about here].

B. Post-Stop Outcomes

Police officers frequently assert they do not know the race of a driver before a stop. But once a driver has been stopped, law enforcement officers are in a position to form a perception of the driver's race. For this reason and due to concerns about the precision of estimated racial shares of the driving population (the so-called benchmarking problem), post-stop outcomes are of significant interest. Table 2 summarizes post-stop outcomes for 2015 for all agencies in the state. An * identifies the rates for Black, Asian, or Hispanic drivers that are statistically different from the rates calculated for white drivers (with a z-score greater than 2).

[Table 2 about here].

One way to evaluate racial differences in post-stop outcomes is to compare the percentage of drivers receiving a citation (ticket) versus a warning. Black and Hispanic drivers are more likely to receive tickets than white drivers (Table 2). With regard to arrest rate disparities,

[12] Table 2 in Seguino and Brooks (2017) shows racial shares of county populations from the ACS and DMV. The number of Blacks, Asians, and Hispanics in the DMV dataset is too low in all but a few counties for a reliable estimate. For those counties that do have sufficient data, we use the higher percentage of Black shares in order to produce conservative estimates of racial disparities.

Black drivers in Vermont are more likely to be arrested after a stop than any other racial/ethnic group (2.1% of Black drivers were arrested subsequent to a stop, compared to 1.2% of white drivers in 2015). Because the emphasis in race data analysis is on officer discretion, arrest rate disparities, while of interest, are opaque insofar as agency policies may play a strong role in determining who is arrested.[13]

Of particular interest in assessing racial disparities in policing are search rates and the percentage of searches that result in contraband being found, hereafter referred to as the "hit rate." Police reports provide data on searches based on three criteria: 1) probable cause, 2) reasonable suspicion (a lower bar of evidence than probable cause), and 3) warrants. A search based on a warrant typically results from an instance in which an officer requests but does not obtain consent from the driver to conduct a search, then impounding the vehicle and seeking a warrant from a judge.[14] We focus here on discretionary searches although the inclusion of searches based on a warrant would not substantially alter our results.

Black and Hispanic search rates are notably higher than the white search rate (3.6% and 2.6%, respectively, compared to 0.9% for white drivers). The Asian search rate is lower than that of any other racial/ethnic group at 0.5%. Critical race theory highlights the disparate status in the US of non-white racial/ethnic groups with Asians typically considered "honorary" whites and a model minority. Search rate disparities between Black and Hispanic drivers on the one hand, and Asian drivers on the other, are consistent with this characterization, with Vermont law enforcement searching Black and Hispanic drivers at 7.0 and 5.2 times the Asian search rate, respectively.

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[13] Bias can clearly play a role in arrest rates, however. Officers, for example, may arrest drivers with a serious infraction if they believe the driver to be a flight risk, and race may play a role in that assessment.

[14] Searches based on a warrant are not entirely discretionary since a judge must grant the warrant although such requests are rarely denied.

Figure 2 presents data on the ratio of Black/white search rates for the three counties with data complete enough to include in our analysis for 2015 and the four largest Vermont law enforcement agencies—Burlington, Rutland, Vermont State Police (VSP), and Williston. The racial differences in search rates are statistically significant with z-scores greater than 3 in all cases. The agency with the greatest disparity is Rutland City, where Black drivers are searched at a rate that is more than 6 times that of white drivers (5.5% of stopped drivers who were Black were searched but less than 1.0% of stopped white drivers were searched). With the exception of VSP, there were too few searches of Asians and Hispanics to report those search rates at either the county or the municipal level.[15]

[Figure 2 about here].

Racial disparities in searches do not in and of themselves prove racial bias. The probability a particular racial group is carrying contraband may be higher than other racial groups, thus justifying a higher search rate for that group. Therefore, a comparison of hit rates across racial groups is a means to identify potential racial bias in searching. This forms the basis of the hit rate test, premised on rational choice theory (Persico and Todd 2008). The logic of this test is as follows. Searches are costly in terms of time and resources. Absent bias, police can be expected to choose and revise search strategies to maximize successful searches—that is, searches that yield contraband. If searches of one racial group result in a lower hit rate than another racial group, the optimizing officer would adjust her search strategy (by raising the threshold of evidence required to trigger a search) in order to minimize unproductive searches, such that hit rates across racial groups are equal. If, however, racial bias influences the decision to search (if, for example, officers have a lower threshold of evidence for one group of drivers as compared to another), the hit rate for minority drivers (e.g., Black or Hispanic drivers) would be lower than for

[15] The Asian/white search rate ratio at the VSP is 0.804, indicating that Asian drivers are roughly 20% less likely to be searched than white drivers. In contrast, the Hispanic/white search rate ratio is 4.06.

white drivers. Another way to view this is that minority hit rates that are lower than white hit rates are an indication that police may be over-searching minority drivers because they rely on a lower threshold of evidence to trigger a search.

A complexity of using the hit rate is that contraband varies in severity. In Vermont, weapons are not contraband, but a pack of cigarettes in the vehicle of a 16 year old is, for example. Ideally, then we would want to be able to control for the severity of the contraband found, and place greater weight on more severe infractions (such as possession of illegal quantities of drugs).[16] Vermont data only indicate whether contraband was found or not, but offer no information on the nature or quantity of the contraband found. To get at this, we examined hit rates in three ways. We calculated hit rates for all outcomes, for only those cases where a ticket was issued or the driver was arrested (or both), and for arrests only. An arrest subsequent to a search is consistent with contraband that is of a more serious nature or quantity.

Hit rates are lowest for Blacks and Hispanics, the two racial/ethnic groups with the highest search rates (Table 2). Asians have the highest hit rate (88.9%), the group least likely to be searched. In cases that result in a ticket and/or an arrest, the white hit rate is 67.0%, compared to 56.1% and 60.7% for Black and Hispanic searched drivers, respectively. The only statistically significant difference in hit rates is between white and Black drivers in cases where the outcome is a ticket and/or arrest. Thus, searched drivers who are Black are less likely to be found with contraband that results in a ticket or arrest. When warnings and tickets are excluded, the white hit rate falls to 15% and the Black hit rate falls to 12%, again lower than the white rate, but not statistically significant at the state level.

[16] Vermont legalized cannabis in 2018. At the time the data used in this study were collected, cannabis was not legal but had been decriminalized for quantities of one ounce or less to a civil infraction (misdemeanor) in 2013.

Only four agencies have enough hit rate data on which to base statistical inferences—Burlington, Rutland, VSP, and Williston (Figure 3).[17] In all cases, white hit rates exceed those of Black drivers. All white-Black differences in hit rates are statistically significant with z-scores that exceed 2.0 with the exception of Williston. That said, Williston's white-Black hit rate differences for all outcomes as well as arrests only are both statistically significant.[18] The hit rate test results are consistent with a hypothesis of racially biased policing whereby these law enforcement agencies rely on a lower threshold of evidence to initiate a search of the driver's vehicle.

[Figure 3 about here].

Figure 4 compares Vermont Black/white search and hit rate ratios to those of other states and cities in the US.[19] We use Vermont statewide data as well as agency-level data for those agencies with sample sizes large enough on which to base inferences. Vermont's racial disparities in search and hit rates, whether viewed at the statewide level or by agency, are notably higher than in other parts of the country that are more racially/ethnically diverse, including North Carolina, Missouri, and Kentucky. It is noteworthy that Black/white search rate ratios in all agencies represented (Figure 4, *Panel A*) exceed 1, indicative of over-searching of Black drivers relative to white drivers and/or under-searching of white drivers. Vermont agencies rank in the top 25% of those with the widest Black-white search rate disparities.

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17 Individual agency hit rates are shown in Seguino and Brooks (2017, Table A3), revealing a number of instances in which white hit rates exceed those of Black drivers, although sample sizes are too small to make inferences. It will thus be important to review hit rate disparities for smaller agencies as more data become available.

18 See Seguino and Brooks (2017, Table A4) for results of statistical tests of differences of proportions for all four agencies. White-Black differences in hit rates that result in any outcome—a warning, ticket, or arrests—were statistically significant in all four cases as were hit rates that resulted in an arrest. Only VSP had enough data to conduct statistical tests of differences in white-Hispanic hit rates. See Seguino and Brooks (2014b) for more details on those tests. As those results show, white hit rates were higher than Hispanic hit rates and the differences were statistically significant with $p<0.01$.

19 There is no national database on race and traffic stops and therefore, we rely on individual studies as well as data analyzed by the Stanford Open Policing Project. We report the data for the most recent year available, ranging from 2009 to 2017.

Panel B in Figure 4 compares Vermont Black/white hit rate ratios to those in other cities and states. Ratios below 1 are indicative of anti-Black bias in searches, given that a smaller proportion of Black drivers compared to white drivers were found with contraband. Because items that count as contraband differ across states and because of the diluting effect of counting low-level infractions that lead to a warning, comparisons of hit rates across agencies should be viewed with some caution. Nevertheless, as can be seen, two of the four Vermont agencies with a large enough sample size have amongst the lowest Black/white hit rate ratios of all agencies in this group.

[Figure 4 about here].

Each of the indicators in this statewide Vermont race data analysis reveal racial disparities among Black and Hispanic drivers in Vermont relative to whites, and viewed together, mutually reinforce the conclusion that these disparities are not due to chance. They are consistent with a claim of systemic racial bias in the manner in which Vermont police officers stop and treat citizens subsequent to stop.

C. Do Racial Disparities in Search and Hit Rates Disappear When We Control for Context? It is reasonable to question whether context can explain racial disparities in search and hit rates in Vermont. Some driving behaviors and circumstances may co-vary with race, resulting in inaccurately attributing disparities in outcomes to race when in fact they are due to other factors. If, even after controlling for factors like gender, age, reason for stop, and time of day, race is found to be a statistically significant predictor of a search and the likelihood that contraband is found, this reinforces the evidence that the race of the driver, independent of other factors, influences traffic policing in Vermont.

i) Probability of Search Methodology

Multivariate logistic regression analysis assesses the differential probability of Black, Asian, Hispanic, and Native American drivers being searched as compared to white drivers. The full model takes this general form:

$$\textit{Probability of Search} = \beta_0 + \beta_b{*}\textit{Black} + \beta_a{*}\textit{Asian} + \beta_h{*}\textit{Hispanic} + \beta_{na}{*}\textit{Native American} + \beta_i{*}\textit{Day of Week}_i + \beta_j{*}\textit{Reason for Stop}_j + \beta_m{*}\textit{Male} + \beta_{age}{*}\textit{Age} + \beta_k{*}\textit{Time of Day}_k + \beta_l{*}\textit{Agency}_l + \textit{Residual.}$$

Dummy variables for each racial group are included, with white the excluded category. In our model, the coefficients for each of the driver race variables can be interpreted as the odds of a search for a driver of that race as compared to the odds for white drivers with the same other characteristics. An odds ratio that is greater than one indicates a group is more likely to be searched than the omitted (or benchmark) group. Finally, an odds ratio that is less than 1 is indicative of a lower probability of a group being searched relative to the omitted group. We estimate this model using all years of data available to us and for 2015 only.[20] Summary statistics for all years and 2015 only are in the appendix.

The coefficient on driver age reflects the increased (decreased) probability of being searched as age of driver rises. Similarly, the coefficient on *Male* indicates the odds male drivers will be searched compared to that of women drivers. The coefficients on the *Reason for Stop* variables indicate the odds of being searched for each reason for a stop as compared to odds of being searched due to motor vehicle violations (the omitted category) where the reason may be one of the following: investigatory stop, suspicion of driving while under the influence (DWI), vehicle equipment, and for reasons unknown (that is, the reason was not

[20] While using all years of data increases our sample size, results are heavily weighted toward the largest agencies that began data collection before smaller agencies.

stipulated in the incident report).[21] We also control for the day of the week and the time of day, with the excluded categories respectively, Friday and afternoon. Controlling for all of these factors allows us to interpret the race variable, net of the impact of these other control variables.[22]

Results are shown in Table 3. Starting with the basic model for all years (Model 1) in which race of the driver is the only explanatory variable, Black drivers are 4 times more likely to be searched than white drivers. In contrast, Asian drivers are a little more than half as likely to be searched as white drivers. Native Americans are almost 3 times more likely to be searched and Hispanic drivers 3.5 times more likely to be searched.

[Table 3 about here].

Model 2 adds gender and age of driver, time of day, and day of week. Since not all agencies report these variables, the number of observations decreases from roughly 409,000 to about 367,000. The odds ratio on age is below 1.0, indicating that that the older the driver, the lower the probability of being searched. The odds ratio on the gender of the driver indicates that male drivers are more than twice as likely to be searched as female drivers. The time of day results show that the probability of being searched is lower in the morning than in the afternoon and greater at night than in the afternoon. The addition of these controls reduces the odds ratio of Black drivers being searched compared to white drives to 3.21 although care should be taken in comparing the results of the two regressions since some of these controls, such as time of day

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[21] Externally generated stops and searches based on a warrant are excluded from this analysis in order to focus on searches based on officer discretion.

[22] In regression results not reported here, we also controlled for law enforcement agencies. This addresses the potential problem of unequal sample sizes by agency as well as the fact that agencies are located in different parts of the state with varying conditions that might influence search rates. Coefficients on the race variable, available on request, were very similar those in the model with all controls. We also ran these regressions with partial controls (not reported here), so as to include all agencies in our analysis. This was necessary due to the missing data problem. Because some agencies did not report data on control variables such as gender or age, we lose those observations when we include those independent variables in our regression. We found that race search rate odds ratios were somewhat larger than when all independent variables were included. Omitted variable bias is still possible if race is correlated with variables that we are not able to include in the model.

and type of stop, may be correlated with biased policing. For Hispanic drivers, the odds ratio also falls marginally to 3.022.

Models 3 and 4 repeat the analysis but limits the sample to data for 2015 only, the year for which we have full data from all agencies. In Model 3, where we control only for race, the odds of being searched for Black drivers is 3.871 times greater than for white drivers. Asian driver odds of being searched relative to white drivers are slightly more than one half (they are half as likely to be searched, that is). And Hispanic drivers are 2.95 times more likely to be searched, compared to white drivers. Model 4 includes all control variables. The odds ratio of a Black driver being searched falls slightly but is still high at 2.651. The odds of Asian drivers being searched compared to white drivers also falls to 0.310 with the added controls, while the odds ratio of a Hispanic driver being searched relative to a white driver falls to 2.493.[23]

Taken together, this evidence suggests that racial disparities in search rates are extremely robust at the state level, regardless of the contextual factors controlled for. The use of more rigorous statistical techniques does not in any meaningful way change the nature of the descriptive data analysis in the Section IIIB.

ii) The Probability of Finding Contraband

We conduct logistic regression analysis to assess the role of race in the probability of finding contraband, subsequent to a search. As in the analysis of search rates, we control for other factors that may influence the probability of contraband being found to avoid erroneously attributing to race the effect of other factors. Again, we exclude externally generated stops and searches based on a warrant. The equation we estimate is as follows:

[23] The number of Native American drivers stopped and searched in 2015 is too small to be able to make reliable inferences.

$$\textit{Probability of Finding Contraband} = \beta_0 + \beta_b{*}\textit{Black} + \beta_a{*}\textit{Asian} + \beta_h{*}\textit{Hispanic} + \beta_{na}{*}\textit{Native American} + \beta_i{*}\textit{Day of Week}_i + \beta_j{*}\textit{Reason for Stop}_j + \beta_m{*}\textit{Male} + \beta_{age}{*}\textit{Age} + \beta_k{*}\textit{Time of Day}_k + \beta_l{*}\textit{Agency}_l + \textit{Residual.}$$

Table 4 reports the results of the probability of contraband found for searches for all outcomes of a search (warning, citation, and/or arrest) and for hits that result in citation and/or arrest only for all years for which we have data. The results shown for Model 1, where the only explanatory variable is race of the driver and includes all outcomes, indicate that the odds ratio for Black and Hispanic drivers to be found with contraband subsequent to a search are half the odds ratio for a white driver. The difference in the probability of Asian drivers being found with contraband compared to white drivers is not statistically significant. The addition of controls in Model 2 does not in any meaningful way alter the odds ratios of finding contraband in searches of Black, Asian, and Hispanic as compared to white drivers.

[Table 4 about here].

We re-ran the regressions, focusing on contraband that resulted in issuance of a citation or in an arrest. (Minor cases of contraband, such as an open container or a juvenile in possession of cigarettes, were coded as no contraband). The results (Models 3 and 4) indicate that by recoding warnings as no contraband, the probability of Black and Hispanic drivers being found with contraband relative to white drivers is marginally higher than when all types of contraband are included, but still well below parity.

To sum up the results of the logistic regressions, adding controls for a variety of contextual factors has little effect on racial disparities in the probability of being searched and of contraband being found during a search. Controlling for a variety of factors, race continues to be a statistically significant factor in an officer's decision to search a vehicle. Moreover, and with regard to the question of racial bias as an explanation for such disparities, we find that Black and

Hispanic drivers are less likely to be found with contraband even after controlling for contextual factors, a finding that is consistent with over-searching of those groups (and/or under-searching of white drivers).

IV. REFORMS TO ADDRESS BIAS IN POLICING

The data presented in Section III, representing the first statewide analysis of racial disparities in Vermont traffic stop policing, drew significant public attention to the problem of racial inequality and discrimination in Vermont with an impact on legislation and policing.[24] To assess this impact, we reviewed Vermont legislation designed to addresses racial bias in state government and the criminal justice system enacted over the last several years. We also conducted interviews with the three Vermont law enforcement agencies noted for their voluntary reform efforts in this area.

A. Legislative Actions

Following the start of voluntary race data collection in Chittenden County in 2009 and the subsequent analyses conducted by the authors, the Vermont legislature adopted several race bills to promote bias-free policing and to address racial bias in other institutions. Apart from the 2013 bill requiring all law enforcement agencies to collect and make publicly available race data on all traffic stops, bills enacted fall into four categories: 1) fair and impartial policing policies, 2) criminal justice reform, 3) systemic racism in state government, and 4) ethnic studies curriculum in K-12 education in Vermont.

i) Fair and Impartial Policing (FIP) Policies

[24] The authors made more than a dozen public presentations of their 2017 results, including to the VSP command staff and its Fair and Impartial Policing committee, Burlington Police Department command staff and all roll calls, Burlington City Council, an association of criminal defense lawyers, numerous faith groups, as well as a press conference to present the results of the report, attended by city officials and police chiefs, the state's Commissioner of Public Safety, and members of the public.

Our findings on racial disparities in Vermont traffic policing combined with evidence on disparities in incarceration and increased national attention resulting from police videos of excessive use of force contributed to growing attention to racial bias in Vermont policing (Nellis 2018). The 2015 detention of a Mexican citizen who was a passenger in a vehicle pulled over for a routine traffic stop was also a factor in legislative action.[25] Over the period 2012-17, the legislature passed a series of modifications to a bill requiring the Criminal Justice Research Council to develop a model Fair and Impartial Policing policy that individual agencies are now required to adopt.[26] The FIP policy is designed to protect Vermonters from biased policing based on personal characteristics (such as race, gender, or sexual orientation) or immigration status. In response to concerns about police treatment and targeting of migrant workers, this policy also limits local police from engaging in immigration enforcement.

ii) Criminal Justice Reform

In 2017, the legislature passed Act 54. As part of that act, the Racial Disparities in the Criminal and Juvenile Justice System Advisory Panel was formed under the aegis of the Attorney General's office to provide recommendations to address racial disparities in the criminal and juvenile justice systems and to inform the continued work of the legislature on racial inequality. The panel's work includes reviewing police data,[27] providing recommendations regarding training and best practices for law enforcement, judges, prosecutors, and defense attorneys; educating and engaging with the community; and producing a biennial report to the legislature.[28]

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[25] Vermont hosts a large number of migrant workers in the dairy industry and agricultural harvests. Migrant Justice, a grassroots group advocating for migrant rights, has been a vibrant force in pushing for adoption of FIP policies that restrict the police in requesting driver and passenger information and reporting their immigration status to ICE.

[26] The model FIP policy can be found here: https://vcjtc.vermont.gov/content/model-fair-and-impartial-policing-policy.

[27] The panel (and law enforcement agencies) use the template and indicators developed in Seguino and Brooks (2017).

[28] For the panel's most recent report to the legislature to which the authors provided testimony, see https://legislature.vermont.gov/assets/Legislative-Reports/Report-of-the-Racial-Disparities-in-the-Criminal-and-Juvenile-Justice-System-Advisory-Panel-12.4.19.pdf.

iii) Systemic Racism in State Government

It became clear to legislators, as a result of consultations with grassroots groups, the Vermont Human Rights Commission, and other stakeholders, that understanding and eliminating the disparities in the criminal and juvenile justice systems required looking at systemic racism in state government and in the private sector. As a result, Section 3 of Act 54 charged the Attorney General's Office (AGO), in consultation with the Human Rights Commission, to develop a strategy to address racial disparities within the state systems of education (discussed below), labor and employment, access to housing and healthcare, and economic development.[29]

The legislature also passed Act 9, creating a five-member Racial Equity Advisory Panel and a cabinet-level Executive Director of Racial Equity tasked with identifying and combating systemic racism in all levels of state government.[30] The executive director's tasks include: 1) a comprehensive organizational review to identify systemic racism in all three branches of state government, 2) management and oversight of statewide collection of race-based data to determine the nature and scope of racial discrimination within state government systems, and 3) development of performance targets for the General Assembly, Judiciary, and state agencies in order to evaluate the effectiveness of reforms.

iv) Ethnic Studies in the Curriculum

In addition to Seguino and Brooks (2017) which provided evidence of racial disparities in policing, a series of racially motivated events, such as the death threats received by Vermont's lone Black women legislator, led to a sense of legislative urgency.[31] Amidst the bevy of legislation

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[29] The bill can be found here: https://legislature.vermont.gov/bill/status/2018/H.308. One of the authors of this study serves on that panel.

[30] The director has also been empowered to act as a liaison and to inform the work of the Governor's Workforce Equity and Diversity Council, established in 2017 by executive order to advise on the development, implementation, and maintenance of the state's Affirmative Action Program and report on the integration of diversity issues with statewide planning and development efforts.

[31] The legislator, Kiah Morris, has since filed a lawsuit against the Bennington Police Department (with some of the widest racial disparities of all agencies in Vermont) for under-protecting her and her family, while at the same time

that had been proposed, an over-arching theme emerged: that in addition to collecting and analyzing data and changing policies, addressing racial disparities and discrimination requires changes in the underlying culture of the state with regard to race. One of the main suggestions for accomplishing this was to educate children from a curriculum that fairly represents both the contributions of people of color, women, and people with disabilities, while representing the history of oppression of these groups.

In this spirit, the legislature in 2019 passed Act 1, which created the 20-person Ethnic and Social Equity Standards Advisory Working Group to advise the State Board of Education on the adoption of ethnic and social equity studies standards into statewide educational standards.[32] The bill also requires the Agency of Education (AOE) to collect and report data on student performance and hazing, harassment, or bullying incidents disaggregated by student groups, including ethnic and racial groups, poverty status, disability status, English language learner status, and gender. Here, as in other legislative actions, there is a strong emphasis on data collection and analysis to inform, monitor, and evaluate policy.

In all, the state created six new agencies and organizations[33] to address issues of racial inequality since 2017, adding to the four that had been created in the previous 18 years. The current legislative session, further, is taking up bills to ban chokeholds, mandate the use of body cameras, and expand the collection of traffic stop race data. Proposals to reduce the size of police departments have been advanced in several Vermont towns and cities. A bill to reduce the incarcerated population of Vermonters and invest the savings in strategies to improve public

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over-policing people of color. The data reported in Seguino and Brooks (2017) study has been pivotal in several subsequent lawsuits against other local law enforcement agencies for racial profiling as well.

[32] The final bill can be found here: https://legislature.vermont.gov/Documents/2020/Docs/BILLS/H-0003/H-0003%20As%20Passed%20by%20Both%20House%20and%20Senate%20Official.pdf

[33] In addition to those mentioned, the following entities were created between 2017-19: Diversifying the Educational Workforce, Vermont 2020 Complete Count Committee, and Vermont Commission on Native American Affairs.

safety is also under consideration in response to the recommendations of the newly created attorney general's panel on criminal justice reform.

B. Voluntary Law Enforcement Reforms[34]

Among the 69 law enforcement agencies in Vermont, three of the largest—Vermont State Police, South Burlington Police Department (SBPD), and Brattleboro Police Department (BPD)—have enacted a variety of reforms to address racial disparities identified in the traffic stop data. In contrast, many other agencies have reacted negatively to data collection efforts, disputing the results of the data analysis.

The reform-minded agencies report reacting with "shock and awe" to the Seguino and Brooks (2017) study, which represented the first analysis of Vermont statewide traffic stop data. In contrast to the defensiveness of a majority of law enforcement agencies, the leadership of these reformers sent the message to their officers that despite what they may believe are imperfections in the data, the disparities they show are real and that it is the responsibility of law enforcement to use the data analysis as a guide to understand why racial disparities exist and to eliminate practices that leads to unjustifiable disparities. The reform efforts fall into four categories: 1) data, 2) accountability of personnel, 3) recruitment and hiring, 4) training, and 5) policies.

i) Data

Data reform efforts have been directed at the obligation of law enforcement agencies to produce more accurate data to improve the quality of the findings and to abide by the law. Two major problems existed in the data used in Seguino and Brooks (2017): large amounts of missing data in incident reports filed by officers, and a lack of consistency in how officers applied real world

[34] This section is based on authors' interviews in December of 2019 with Captain Garry Scott (VSP), and Chiefs Shawn Burke (SBPD) and Michael Fitzgerald (BPD).

events to data categories (for example, officers had differing interpretations of what constituted an investigatory stop).

Seguino and Brooks (2019) summarized the current data deficiencies, and recommended additional categories of data be collected on traffic stops as well as on use of force. We also proposed a new arrangement for managing data (shifting control from an outside vendor who managed the data to state oversight in the Attorney General's office) and holding law enforcement accountable for fulfilling their obligations with regard to data collection.

Vermont State Police (VSP) developed a data collection and quality training module in 2017 in response to the authors' earlier analyses of VSP traffic stop data. The training module was used to train troopers at VPS's 12 barracks throughout the state. The VSP training material is now also used by the Vermont Criminal Justice Training Council (VCJTC), which oversees training of new police recruits to Vermont's Police Academy. Missing data has dramatically declined in VSP data reports in stark contrast to a number of the non-reformers, which continue to have problems of missing data and a failure to report data to the state in a timely manner. SBPD and BPD have also made strides in requiring complete incident reports, and thus reducing missing data.

ii) Accountability of Personnel

A defining characteristic of the three reform-minded agencies is their use of the traffic stop data to promote officer accountability. To varying degrees, these agencies review traffic stop data periodically (in some cases, monthly) to keep track of officers' stop, arrest, and search rates as compared to that of their peers. In the policing literature, this is called internal benchmarking. Supervisors engage those officers/troopers, whose data indicate they are outliers, in discussions about their policing practices, sending a message that the command staff is committed to eliminating unjustifiable disparities. VSP also has a tracking system for high-speed chases, use of

force, and complaints against troopers. Officers accruing three of these events in a 6-month period are required to meet with their supervisors to review videos of traffic stops. This too helps spread by word of mouth that the agency is actively monitoring troopers to ensure FIP policies are adhered to. And finally, every member of VSP's command staff must meet with the agency's accountability panel to answer questions on how they are actively supporting FIP policies.

BPD command staff review traffic stop data once a month, and randomly select officers for in-depth reviews. In the event of notable racial disparities, supervisors discuss with the officer her/his policing practices, and officers are required to articulate why disparities exist. That officer is then observed for the next 30 days to determine whether disparities are ongoing. Additionally, once a quarter, the BPD staff randomly selects officers for scrutiny, contacting every 10th person the officers have had contact with for an assessment of the officer's comportment. BPD differentiates itself from other law enforcement agencies in Vermont by evaluating officers on their performance on bias-free policing.

SBPD's approach to using traffic stop data as an accountability tool differs from the other reform-minded agencies. Although individual officer data is not monitored, the leadership maintains a focus on the agency's traffic stop data at roll call and in department-wide meetings. The goal is to keep the topic relevant without creating "anxiety" among officers. This approach is similar in effect to that of implicit bias training, which emphasizes the usefulness of in-the-moment reminders about the potential for racial bias as a way to make conscious those attitudes and biases that are unconscious.

iii) Recruitment and Hiring

Reform-minded agencies report that the traffic stop data analysis helped them recognize the need to diversify their workforces. Hiring is a multi-stage process that requires (sequentially) an

application, Vermont Police Academy test,[35] an oral hiring panel interview, polygraph test, background investigation, and interview with command staff (typically the chief or commander).

The first step in diversifying is the generation of a diverse pool of candidates. Until recently, Vermont law enforcement agencies primarily advertised job vacancies on their own websites. Reform agencies now recruit outside of Vermont at job fairs at universities, including HBCUs, as well as military bases. Their regional focus is primarily the northeast. VSP as the biggest and best-endowed agency has three full-time recruiters (among which are two women including one of color). Outreach via social media has also expanded.

BPD's police chief emphasizes the critical need for racial diversity among the ranks of officers and works jointly with the city of Brattleboro to recruit diverse candidates for all aspects of city government. As part of an annual city-wide recruitment event, students from nearby schools (including Massachusetts and New Hampshire) are invited to the city for a tour of the town, and visits to the police department (with opportunities for ride longs), state's attorney office, the Brattleboro Community Justice Center, among others. The goal is to generate a pipeline of applicants from diverse backgrounds. BPD also relies on the Community Equity Collaborative (CEC) for support in outreach for recruitment.[36] SBPD also has engaged the support of community members of color in the recruitment (and hiring) process to expand their outreach efforts.

Despite these efforts, BPD and SBPD have made little headway in recruiting and hiring a more diverse workforce.[37] In part, they argue, this is due to the lack of resources to recruit in

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35 All Vermont recruits must complete a 16-week training at Vermont Police Academy, which is then typically followed by agency-specific training. Minimum education required is a high school diploma or its equivalent. VSP recently revised its policies to permit the hiring of people with tattoos as a means to expand their applicant pool.

36 The CEC is a local grass roots group, borne out of a 2009 incident in which a group of high school age members of a white supremacist group harassed a group of minorities at the Brattleboro Transit Center. The CEC is an example of the emergence and spread of grass roots groups in Vermont that have come together over the last decade to address racial bias in their communities.

37 That said, BPD reports a more diverse applicant pool than in the past.

cities with a more diverse population such as Syracuse or Buffalo in neighboring upstate New York. VSP has, however, made some progress in improving its applicant pool, with 2019 yielding 595 applications (for a target recruitment class of 20 troopers) of which 13% were women and 19% people of color.[38] VSP lacks trend data on applicant pools but sees the recent pool of applicants as improvement.

A major impediment to diversifying Vermont police agencies is the Vermont Police Academy exam, which applicants must pass in order to progress in the hiring process. According to VSP, roughly 50% of applicants of color fail to pass this exam. Concerns have been raised about potential bias of the test, and the VTJTC, the police academy's governing body, has disseminated a request for proposals (RFP) to review the exam and recommend changes.

The VSP has expanded the depth and breadth of background investigations to filter out candidates with problematic past associations with racially biased groups. In addition, the oral exam explores attitudes, requiring applicants to describe how they would behave in situations where bias has been found. As an example, recruits are asked to explain how they would respond to a call from a fearful store clerk late at night, reporting a vehicle with out-of-state plates driven by a lone Black male. VSP differentiates itself as a reform agency in its willingness to allow vacancies to remain unfilled if there is an insufficient qualified applicant pool that demonstrates cultural sensitivity and awareness of racial bias issues.[39] This is especially noteworthy given that many law enforcement agencies, including VSP, report difficulty in filling vacancies in recent years.

iv) Training

[38]Ten percent were Black, and the remainder Asian, Hispanic, or some other race.
[39] Oral interview questions also focus on gender identity. An example scenario is that a transgender woman is stopped for speeding. She hands the officer a male driver's license. The interviewee is asked how she/he would handle this.

The Vermont legislature has mandated at least four hours of anti-bias or FIP policy training for all law enforcement officers by December 2018, with training in odd-numbered years in order to remain certified. Trainings must be approved by the VCJTC, although there is no evidence that such trainings have occurred in other agencies or that the VCJTC is monitoring compliance. The reform agencies, however, voluntarily took up this work, even prior to the passage of the legislative bill on training.

VSP has instituted the most extensive training reforms relative to other agencies. In part, this can be explained by VSP's size as the biggest and best-resourced agency in the state. VSP's anti-bias training dates back to 2006 in response to a community survey in which 90% of people of color responded that they do not have confidence in the police. Our studies (especially Seguino and Brooks 2014b, 2015b and 2017) and now their own follow-up data analyses demonstrating traffic stop disparities have fuelled VPS's continued commitment to training as a means to address potential racial bias.[40]

VSP focused first on training command staff, recognizing that for systemic change, leadership had to understand and support the direction the agency adopted in promoting fair and impartial policing. In the second stage, trainings were developed for new recruits. Subsequent to 16 weeks of Vermont Police Academy training, new recruits now undergo an additional 9 weeks of VSP training, of which one day is cultural sensitivity training. This training, conducted jointly by VSP staff and community members of color, some of whom are professional trainers, includes exercises such as a viewing and discussion of Ava Duvernay's *Thirteenth* and completion of the Implicit Association Test. The goal is to train recruits in understanding the impact of stereotypes and implicit bias on decision-making. Given the extensive discretion troopers and officers

[40] VSP racial disparities were noteworthy in the first round of traffic stop data analysis we conducted on 2010-2011 data, with search rates of Hispanic drivers 5.6 greater than of white drivers as compared to 3.3 times greater than those found in 2018, while hit rates were half those of white drivers (compared to 90% in 2018). Black-white disparities were also wide but have not diminished over this time period (Seguino and Brooks 2014b).

possess in their work (such as whom to stop, issue a citation to, and search), implicit bias training is seen as essential to the training officers receive.

VSP is now expanding its training efforts to troopers that have been in service for 10 to 15 years. Informal leaders (but not supervisors) are the target group for specialized training, conducted in conjunction with community members with expertise on issues or race and bias. The work includes reading books on race and racial history and discussions of videos of recent national police events. And, each week, this group of 35 informal leaders (10% of VSP's sworn troopers) is exposed to news stories of bias and policing (usually at informal lunchtime gatherings), with training on how events can be interpreted from differing perspectives. According to VSP, this develops troopers' flexibility in their own thinking about scenarios they come upon in policing.

SBPD's training protocol does not extend beyond the online FIP online training that officers are required to take and pass, whereby officers read and are tested on the policy. The agency lacks the funding and expertise to mount its own implicit bias trainings, as do many of the smaller agencies in Vermont. SBPD's police chief has noted that the most important trainings the agency would benefit from are on implicit bias, systemic racism, and US racial history, arguing officers would be less defensive about the traffic data results and community criticism of racially biased policing if they had this background.

BPD, too, reports a lack of resources for in-depth trainings. It relies on citywide anti-bias training, required of all department heads, and assistance from outside groups such as the Matthew Shepherd Foundation (for help on recognizing and responding to hate crimes) and area colleges. At the department level, there are now two trainings a year, focused on the agency's progress in implementing its FIP policy.

v) Policies

The major policy reform amongst all law enforcement agencies has been the adoption of the Fair and Impartial Policing policy, although the impetus for this was a legislative bill in 2010, not the agencies themselves. For many agencies, the development of and training on FIP policies is merely a *pro forma* exercise in response to a legislative directive. The reform-minded agencies have, however, relied on their FIP policies to guide their agency's work in reducing racial bias in policing and as part of a tool for self-reflection and evaluation of staff.

As noted, VSP trains extensively on FIP policy and has done so for some time. SBPD, in response to a renewed legislative emphasis on FIP, updated its own policy and leadership has made this the focal point of communications with officers. Similarly, BPD in 2014 underwent a self-assessment in 2014 in every division of the agency, reviewing policies and practices to determine what the agency was doing and how it fit with their FIP policy related to bias-free policing. The process took place over a full year, reflecting the seriousness with which this effort was undertaken, and culminated in a change to BPDs bias-free policing mission statement from "boilerplate" to a more advanced statement.[41]

Finally, all of the reform-minded agencies now emphasize to their officers that the purpose of traffic policing is public safety, not investigation of criminal activity. The traffic stop data caused agency leaders to recognize that traffic stops are not effective for drug interdiction, a task more effectively carried out by investigative units. This is particularly consequential shift in attitude in Vermont where many police chiefs argue that disparate Black-white and Hispanic-white search rates are in response to their belief that it is primarily Blacks and Hispanics who are trafficking drugs into Vermont from Massachusetts, New York, and New Jersey.

[41] The relevant portion of BPD's revised statement is "While serving the community, we recognize the differences in the conduct of people who need our help, those who make poor decisions, and those who choose to victimize others."

This summary of reform efforts represents an aspiration of eliminating unjustifiable racial (and other) disparities. There is as yet no evidentiary basis to ascertain whether such steps have yielded results. In part, this is because it takes time for institutional reforms that are aimed at changing attitudes to have an impact. The analysis of race traffic stop data and the accompanying public attention are ultimately the instrument by which community members and law enforcement agencies will know whether reform efforts have yielded results.

V. CONCLUSION

Based on race data collected and analyzed on traffic stops in Vermont, there is evidence that Black and Hispanic drivers face disparate treatment by police as compared to white and, in some cases, Asian drivers. This assessment is based on analysis of five traffic stop indicators: racial shares of traffic stops, and racial differences in rates of ticket vs. warning rates, and arrest, search, and hits. Of particular note are search and hit rate disparities. Data indicate that, at the state level, the search rates of Black and Hispanic drivers are 4.0 and 2.9 times that of white drivers, respectively. According to the hit rate test, racial disparities in searches are consistent with racially biased policing, with Black and Hispanic drivers less likely than white or Asian drivers to be found with contraband. These results are suggestive of preference-based discrimination on the part of traffic police.

Vermont racial disparities in policing are wider than in more racially heterogeneous states (Figure 4). In part, this may be explained by racial composition of Vermont's law enforcement agencies, which is, like the state, overwhelmingly white.[42] These results contradict racial threat theory which suggests that the greater the presence of the racially subordinate group (Black and Hispanics) in the population, the greater the perceived threat and the more likely policing will

[42] About 2.8% of the VSP are as people of color, compared to about 5.0% of the state's population (Personal communication with VSP Captain Garry Scott, June 2020). VSP is the most diverse police force in Vermont.

serve to restore the power and privilege of the dominant group (whites). It aligns, however, with the findings of Anwar and Fang (2006), who find that white troopers have the widest Black-white and Hispanic-white search rate disparities.

While the numerical dominance in Vermont of those identified as white may help to explain racial disparities in policing, the vigorous response by the legislature—also predominantly white—is not as easily explained. Black political representation in Vermont is very low, with two African American representatives (out of 150) in the Vermont House, none in the Senate, and no Black mayors or town managers. That the traffic data analysis had such a strong impact on legislative actions may in part be due to state's progressive self-identity, although one cannot discount the role of 13 deaths at the hands of Vermont police since 2013. The recent Attorney General panel's report to the legislature on criminal justice reform recommends, based in part on recommendations outlined in Seguino and Brooks (2019), a significant state investment in a robust criminal justice data system to address the current lack of reliable and comprehensive data. A recommendation to embark on a statewide effort to routinely collect and report on racial disparities in use of force data was also made. Further, the degree to which legislative action has gone beyond policing to address systemic racial bias in state government and public education is noteworthy.

Reforms at the level of law enforcement agencies have been sparse, however. Many law enforcement agencies grudgingly complied with the requirement to collect race data in traffic policing, and have failed to use the data in any meaningful way as a management tool. Indeed, some agencies fail to comply with the law, generating only partial data, if at all, and in many cases, of poor quality. Data are not made available on a timely basis, making it difficult for police leadership and communities to hold officers accountable for their policing practices. These failures to comply with the race data collection law highlight the problem of accountability at the

agency level.

Only the VSP is governed and monitored by state government, reporting to the Commissioner of Public Safety. Because the legislation requiring data collection provides no mechanism to ensure compliance, local law enforcement agencies are only accountable to their select boards or city councils, many of which lack the expertise or commitment to addressing racial bias. In contrast, states such as North Carolina address these compliance problems by making state grants to law enforcement agencies contingent on their compliance with traffic data submission requirements (Baumgartner *et al* 2018).

Nevertheless, several Vermont reform-minded law enforcement agencies have responded to the challenge of addressing and eliminating racial bias in policing. They have taken different tacks, ranging from procedures and processes that evaluate employees—command staff, officers, and members of other units—on their bias-free policing performance to a "soft" approach that encourages behavioral changes but without consequences. Training in implicit bias, race history, and cultural competence has also been part of the toolkit of these agencies.

Although recent actions at the state and local level appear promising, the efficacy of these first steps at policing and criminal justice reform in Vermont can only be determined by data analysis. Legislative efforts are underway to implement strategies to improve the types and quality of data collected, as well as incentivize compliance with the law. With five years of traffic stop data now available, allowing for trend analysis (and importantly, large enough sample sizes on which to base inferences, especially for smaller municipalities), the state is in a position to monitor the effects of its efforts, as are reform-minded agencies.[43]

[43] A complexity of such analysis is the 2018 legalization of cannabis in Vermont, which contributed to a reduction in searches by a number of agencies including VSP and Burlington. Colorado has also experienced a decline in searches post-legalization, although racial disparities in search rates continue (Pierson *et al* 2017).

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Table 1. Racial Shares of Police Stops and Population in Vermont, 2015

	White	Black	Asian	Hispanic	Native American
Total stops	101,443	3,146	1,743	1,082	83
Shares of stops	94.4%	2.9%	1.6%	1.0%	0.1%
Share of population	95.1%	1.6%	1.8%	NA	0.0%
Share of accidents	95.2%	1.8%	2.2%	0.6%	0.2%
Disparity Index – ACS	0.99	1.93	0.89	NA	2.50
Disparity Index – DMV data	0.99	1.61	0.74	1.79	0.42

Notes: Total stops = 107,497. NA is not available. For Hispanic drivers, we only provide the share of stops and accidents, but not the population share because the ACS and Vermont police do not use comparable methods of classifying drivers as Hispanic. The share of accidents is for not-at-fault drivers from the DMV.

Table 2. Post-Stop Outcomes, 2015 (All Agencies)

	White	Black	Asian	Hispanic	Native American
Warning rate	62.0%	58.9%*	60.6%	56.4%*	55.4%
Ticket rate	37.4%	40.6%*	38.7%	42.1%*	39.8%
Arrest rate	1.2%	2.1%*	1.1%	1.3%	2.4%
Search rates					
Discretionary search rate	0.9%	3.6%*	0.5%	2.6%*	
Hit rates (as a % of searches)					
Hit rates (includes all outcomes)	79.4%	72.8%	88.9%	75.0%	
Hit rates (outcome = arrest/ticket)	67.0%	56.1%*	88.9%	60.7%	
Hit rates (outcome = arrest only)	15.0%	12.3%	0.0%	0.0%	

Note: These data are for externally generated stops only. Discretionary searches refer to those that the officer has the sole discretion to initiate. Searches based on a warrant require a judge's approval and are not included here.

Table 3. Probability of a Search, All Years and 2015 Only

		All Years		2015 only	
		Model 1	Model 2	Model 3	Model 4
VARIABLES		Race only	Race and all controls	Race only	Race and all controls
Race	Black	3.994***	3.210***	3.871***	2.651***
		(0.208)	(0.189)	(0.385)	(0.327)
	Asian	0.559***	0.449***	0.529*	0.310***
		(0.094)	(0.086)	(0.177)	(0.140)
	Native American	2.829***	3.427***		
		(0.909	(1.123)		
	Hispanic	3.498***	3.022***	2.950***	2.493***
		(0.322)	(0.294)	(0.555)	(0.510)
Day of Week	Saturday		0.979		1.178
			(0.055)		(0.138)
	Sunday		0.950		1.149
			(0.056)		(0.144)
	Monday		0.947		1.075
			(0.056)		(0.139)
	Tuesday		0.981		1.106
			(0.058)		(0.142)
	Wednesday		1.01		1.019
			(0.059)		(0.131)
	Thursday		1.075		1.136
			(0.060)		(0.139)
Reason for Stop	Investigatory Stop		5.978***		6.472***
			(0.389)		(0.795)
	Suspicion of DWI		8.637***		7.178***
			(1.175)		(2.042)
	Unknown		5.004***		6.294***
			(0.689)		(1.247)
	Vehicle Equipment		1.432***		1.074
			(0.054)		(0.095)
Gender	Male		2.075***		1.721***
			(0.081)		(0.136)
Age	Age		0.942***		0.944***
			(0.002)		(0.003)
Time of Day	Morning (4AM - Noon)		0.611***		0.436***
			(0.031)		(0.053)
	Night (8PM - 4AM)		1.281***		1.298***
			(0.046)		(0.098)
	Constant	0.010***	0.023***	0.010***	0.018***
		(0.001)	(0.005)	(0.001)	(0.007)
	Observations	409,390	367,045	104,596	81,772

Note: Standard errors are in parentheses. * p<0.10, **p<0.05, ***p<0.01.

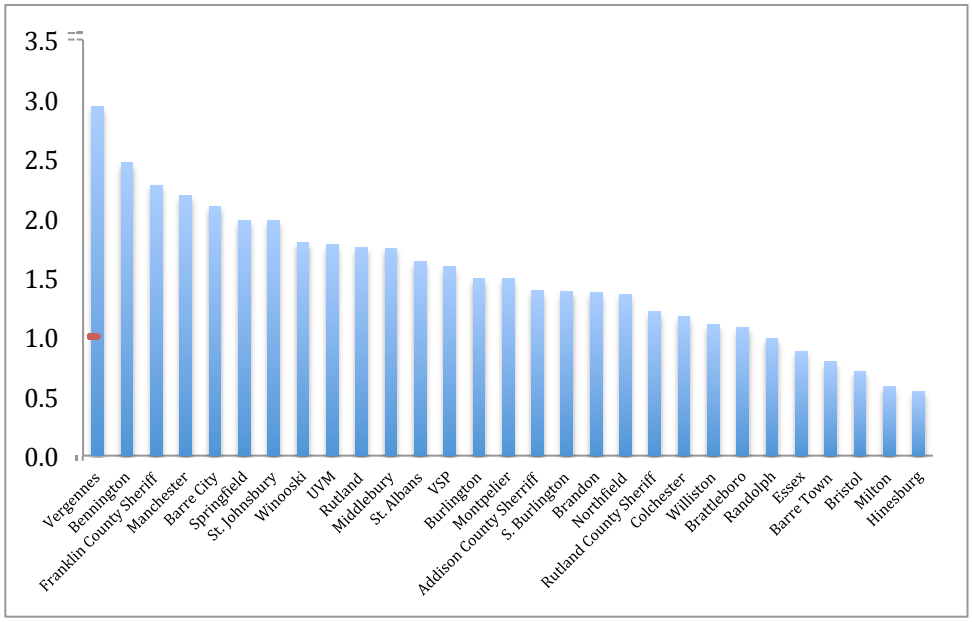
Table 4. Probability of Contraband, All Outcomes and Tickets/Arrests Only, All Years

		All Outcomes		Tickets/Arrests Only	
		Model 1	Model 2	Model 3	Model 4
VARIABLES		Race only	Race and all controls	Race only	Race and all controls
Race	Black	0.484***	0.468***	0.538***	0.550***
		(0.058)	(0.064)	(0.058)	(0.069)
	Asian	0.993	0.686	2.087*	1.574
		(0.449	(0.350)	(0.888)	(0.750)
	Native American	0.319*	0.385	0.541	0.563
		(0.206)	(0.264)	(0.343)	(0.367)
	Hispanic	0.492***	0.409***	0.471***	0.429***
		(0.102)	(0.091)	(0.089)	(0.090)
Day of Week	Saturday		0.668**		0.902
			(0.109)		(0.116)
	Sunday		0.844		1.018
			(0.149)		(0.140)
	Monday		0.623***		0.832
			(0.103)		(0.110)
	Tuesday		0.598***		0.722**
			(0.099)		(0.097)
	Wednesday		0.611***		0.754**
			(0.099)		(0.098)
	Thursday		0.682**		0.707***
			(0.109)		(0.088)
Reason for Stop	Investigatory Stop		1.284		1.754***
			(0.232)		(0.272)
	Suspicion of DWI		1.034		1.029
			(0.377)		(0.325)
	Unknown		0.669		0.575
			(0.250)		(0.195)
	Vehicle Equipment		1.080		0.645***
			(0.109)		(0.052)
Gender	Male		1.253**		1.316***
			(0.133)		(0.115)
Age	Age		0.971***		0.988***
			(0.004)		(0.004)
Time of Day	Morning (4AM - Noon)		0.774*		0.839
			(0.103)		(0.094)
	Night (8PM - 4AM)		0.939		0.988
			(0.043)		(0.080)
	Constant	4.700***	8.588***	1.848***	3.787***
		(0.204)	(4.480)	(0.064)	(1.823)
	Observations	4,197	3,715	4,197	3,721

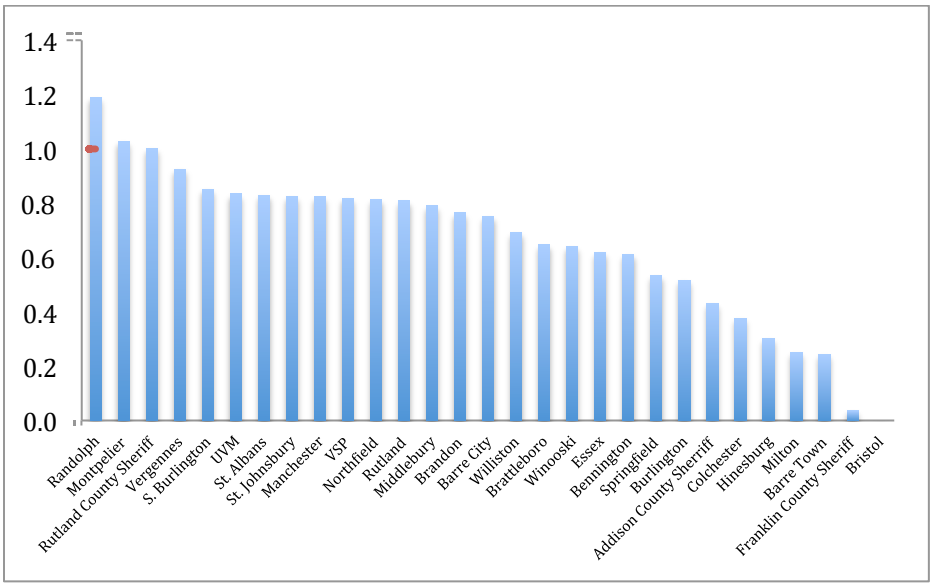
Note: Standard errors are in parentheses. * p<0.10, **p<0.05, ***p<0.01.

Figure 1. Likelihood of a Traffic Stop Compared to Share of Population by Race

Panel A. Black Drivers



Panel B. Asian Drivers



Note: The vertical bars represent the share of Black drivers stopped by the agency divided by the county Black share of the driving population, using ACS estimates for all agencies except for Bennington, Chittenden, and Rutland counties where we use DMV estimates. For Winooski and Burlington, we use city population shares from the 2011-13 ACS, because of the larger Black and Asian populations in these cities, producing a more conservative estimate of stop disparities. VSP is Vermont State Police. UVM is University of Vermont. Estimates are based on all available data for each agency, typically from September 2014 - January 2016, although for some agencies, we have several months of 2016 data and some data for prior years.

Figure 2. Black/White Search Rate Ratios by County and Agency, 2015

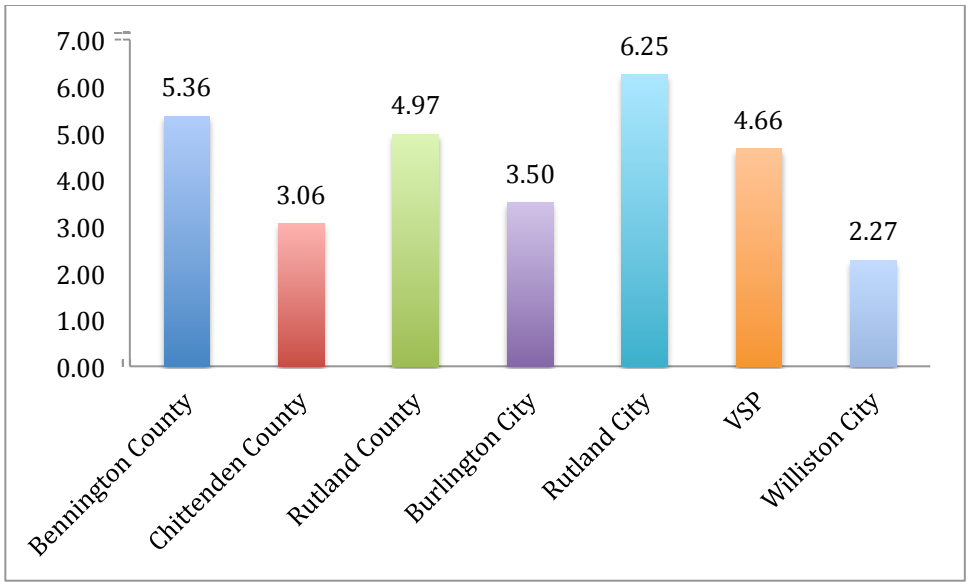
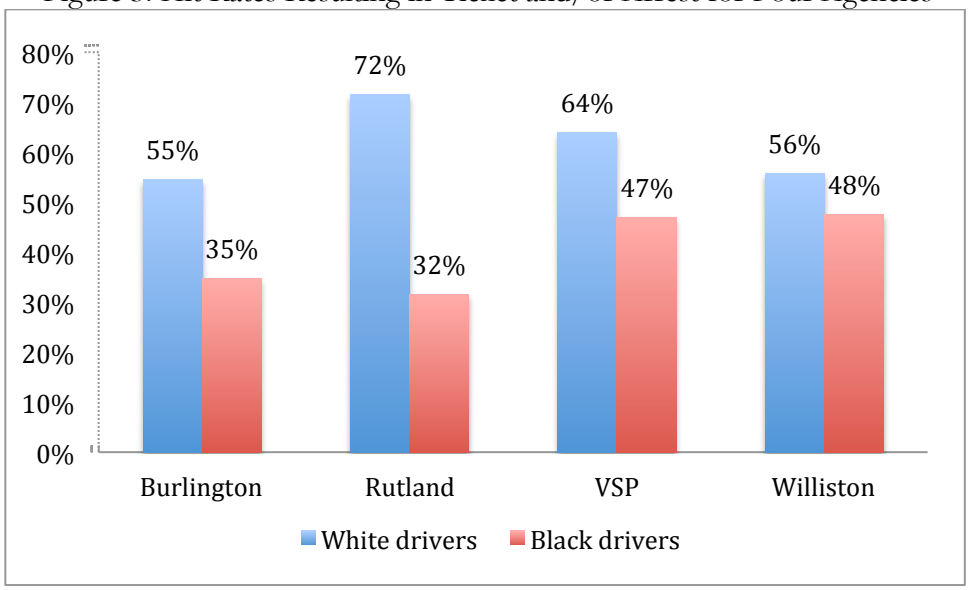


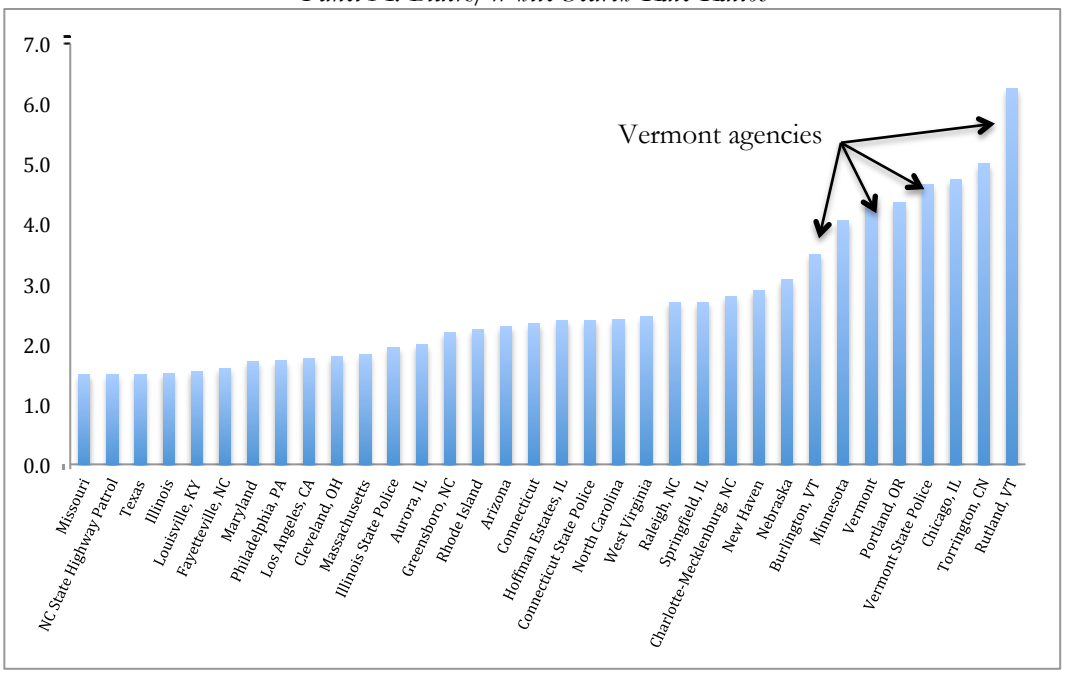
Figure 3. Hit Rates Resulting in Ticket and/or Arrest for Four Agencies



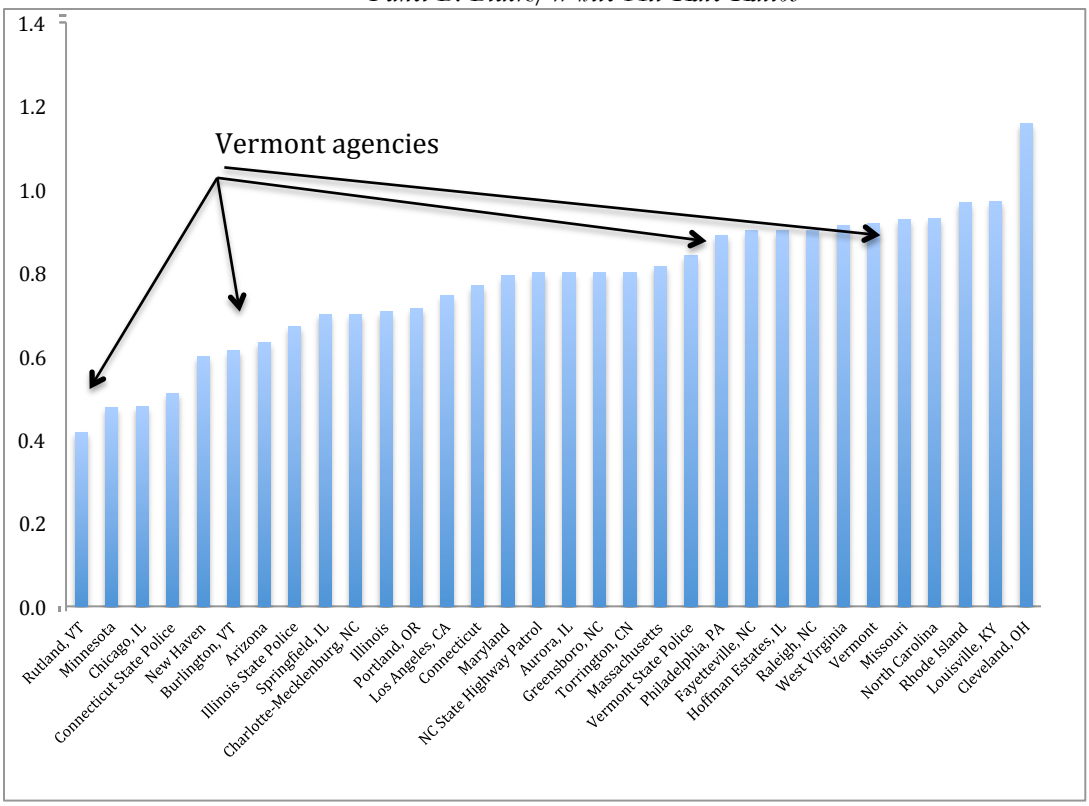
Note: See Seguino and Brooks (2017, Table A3) for each agency's years of coverage, which vary, depending on the data made available to the authors.

Figure 4. Comparison of Black/White Search and Hit Rate Ratios, Selected Cities and States

Panel A. Black/White Search Rate Ratios



Panel B. Black/White Hit Rate Ratios



Sources: Data are compiled from state and city-level studies, state data and reports posted on official websites, and from Pierson *et al* (2020), using the most recent data, ranging from 2003 to 2017. Specifically, for Arizona, see Engel *et al* (2009); for Connecticut, see Ross *et al* (2017); for Los Angeles, CA. see Ayres and Townsend (2008); for Illinois, see Andrew Weiss Consulting (2017); for Chicago, see ACLU Illinois (2014); for Louisville, KY, see Keeling and Braden (2017); for Maryland, see Zuback (2017); for Minnesota, see Montgomery (2016); for Missouri, see Hawley (2018); for Nebraska, see Fisher *et al* (2017); for North Carolina, see Baumgartner *et al* (2018); for Cleveland, OH, see Engel *et al* (2006); for Portland, OR see Stewart and Covelli (2014); for Philadelphia, see opendataphilly.org, for Connecticut, Massachusetts and Rhode Island State Police, see Pierson *et al* (2020); for New Haven and Torrington CT, Aurora, Hoffman Estates, and Springfield IL, Charlotte-Mecklenburg, Fayetteville, Greensboro, Raleigh, NC, and NC State Highway Patrol, NC, see LaFraniere and Lehren (2015).

APPENDIX

Table A1. Data Summary, 2015 and All Years

Panel A. 2015

	White	Black	Asian	Hispanic	Native American
Total stops	101,443	3,146	1,743	1,082	83
Warnings	62,898	1,854	1,056	610	46
Tickets	37,963	1,276	675	456	33
Arrests	1,163	67	19	14	2
Discretionary searches	907	114	9	28	0
Hits	686	80	0	20	0

Panel B. All Years

	White	Black	Asian	Hispanic	Native American
Total stops	392,084	10,689	6,292	3,671	355
Warnings	4,477	6,272	3,746	2,000	180
Tickets	144,635	4,370	2,561	1,612	166
Arrests	243,504	219	49	55	8
Discretionary searches	3,835	421	36	122	10
Hits	2,949	265	28	79	6

Note: Data are for non-externally generated stops only.